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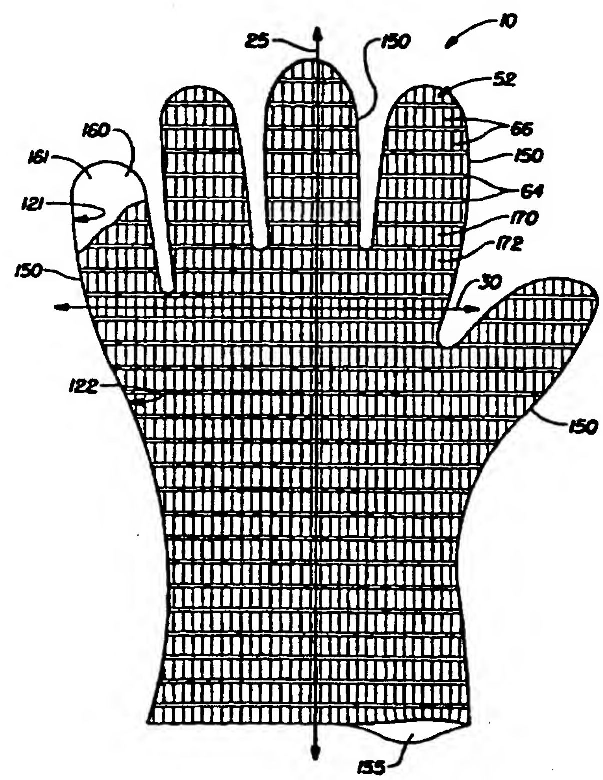
(54) Title: FITTED GLOVE

(57) Abstract

The present invention provides a disposable glove (10) which readily fits and conforms to wearer's hand. The glove (10) includes a front panel (160) and a back panel (170) joined together to form an opening in which to insert a hand. The extension force of the back (170) panel is preferably less than the extension force of the front panel (160).



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FITTED GLOVE

FIELD OF THE INVENTION

The present invention relates to gloves and more particularly to gloves which accommodate different sized hands, provide an overall improved fit, and are easy to manufacture.

BACKGROUND OF THE INVENTION

Gloves and mitts for cleaning and other uses are well known and have been used extensively. For example, U.S. Patent 4,902,283, entitled "Absorbable Cleaning Mitt For Wiping Babies" issued to Rojko, et al. on February 20, 1990, describes a mitt comprising two outer absorbable surfaces and two inner plastic layers joined together along three sides to form an opening. U.S. Patent 4,986,681, entitled "Waterproof Dishwashing Mitten" issued to Oliver on January 22, 1991, describes a mitten comprising latex rubber to protect the hand.

While articles like those in U.S. Patent 4,902,283 provide the ability to clean and absorb waste materials via a mitt or mitten, they do not provide the ability to accommodate varying sized hands without the use of elastics.

Also, while articles like those in U.S. Patent 4,986,687, by their use of rubber and other stretch materials, will accommodate and fit varying hand sizes, they will not do so economically.

Therefore, it is an object of the present invention to provide a glove or mitt which will accommodate varying sized hands using inexpensive materials.

SUMMARY OF THE INVENTION

Accordingly, the present invention is a hand article having a longitudinal axis, a transverse axis perpendicular to the longitudinal axis and a periphery that comprises a front panel that has an inner surface and an outer surface, and a back panel that has an inner surface and an outer surface. The inner surface of the back panel is positioned adjacent to the inner surface of the front panel. The front panel and the back panel are joined together to form an opening into which a hand is inserted, the inner surface of the back panel being immediately adjacent to the back of a user's hand and the inner surface of the front panel being adjacent to the palm of a user's hand. Preferably, the front and back panels are met and joined together at the periphery to form a glove or a mitt.

The front panel and the back panel each comprise a polymeric film and preferably are comprised of the same polymeric film. The extension force required to stretch the back panel is less than the extension force required to stretch the the front panel even though in preferable embodiments the same polymeric film type(s) is used. A preferable embodiment showing this is a back panel that comprises a structural elastic-like film web that comprises a strainable network having first and second regions formed of substantially the same material composition. The first region provides a first, elastic-like resistive force to an applied elongation along at least one axis. The second region provides a second distinctive resistive force to further applied elongation along at least one axis. This construction provides at least two stages of resistive forces in use.

In an alternative embodiment, the front panel comprises a structural elastic-like film web by itself or in addition to the back panel comprising SELF. Preferably, the outer surface of the front panel comprises a plurality of dimples so that objects can be more easily gripped. In a highly preferred embodiment, the back panel is a compound structural elastic-like film web wherein first and second regions of the web cross and intersect one-another. Additionally, the structural elastic-like film web includes two or more axes that are oriented substantially perpendicular to one another and/or are oriented substantially radially to one-another. These additional orientations tend to provide stretching of a polymeric film along more than one axes so that extensibility of a polymeric film is increased.

Another alternative embodiment discloses an absorbent layer that is joined to the inner surface and/or the outer surface of the front panel. These absorbent layers can comprise at least one additive selected from the group consisting of lotion, surfactant, alcohol, water, perfume, anti-perspirant, medicine, cleaning agents, bleach or mixtures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as forming the present invention, it is believed that the invention will be better understood from the following descriptions which are taken in conjunction with the accompanying drawings in which like designations are used to designate substantially identical elements, and in which:

Figure 1 is a plan view of the glove embodiment of this invention having sections cut away to reveal underlying structure;

Figure 2 is a plan view of a preferred embodiment of a SELF web having a

strainable network of the present invention with the rib-like elements facing toward the viewer;

Figure 2A is a segmented, perspective illustration of the SELF web of Figure 2 in an untensioned condition;

Figure 2B is a segmented, perspective illustration of the SELF web of Figure 2 in a tensioned condition corresponding to stage I on the force-elongation curve depicted in Figure 3;

Figure 2C is a segmented perspective illustration of the SELF web of Figure 2 in a tensioned condition corresponding to stage II on the force-elongation curve depicted in Figure 3;

Figure 3 is a graph of the resistive force versus percent elongation comparing the behavior of the SELF web of the present invention as shown in Figure 2, with an otherwise identical, planar, base polymeric web material;

Figure 4 is a plan view of another embodiment of a back panel of a glove of the present invention;

Figure 4A is a plan view of another embodiment of a front panel of a glove of the present invention;

Figure 5 is an enlarged plan view of the structural elastic-like film (SELF) web of Figure 4; and

Figure 6 is a perspective view of the mitt embodiment of the present invention having a structural elastic-like film (SELF) on the back panel.

DETAILED DESCRIPTION OF THE INVENTION

As used herein, the term "hand article", refers to a covering for the hand. The term "disposable" is used herein to describe hand articles which are not intended to be restored or reused (i.e., they are intended to be discarded after a single use, and preferably, to be recycled, composted or otherwise disposed of in an environmentally compatible manner). As used herein the term "glove" refers to a covering for the hand having separate sections for each finger. As used herein, the term "mitt" refers to a covering for the hand having an enclosure that leaves the fingers unseparated and that may include space for the thumb in the main enclosure, or provide space for the thumb in a separate enclosure for the thumb, or may not include a thumb enclosure at all. As used herein the term "dimple" means a depression or indentation on a surface. As used herein the term "extension force" refers to forces applied by hand movements to a surface to extend and/or bend that surface linearly and/or curvilinearly.

A preferred embodiment of a hand article of the present invention is the disposable glove 10 shown in Fig. 1. Figure 1 is a plan view of the glove 10 of the present invention in its flat-out state with portions of the glove 10 being cut-away to more clearly show the construction of the glove 10. The glove 10 comprises a front panel 160, a back panel 170, and a periphery 150 wherein front panel 160 and back panel 170 meet and preferably form a seamless connection. The term "seamless" refers to a surface having substantially no discernible grooves, ridges, indentations or any other irregular surfaces which would be readily discernible to the eye and/or touch. The front panel 160 has an inner surface 161 and an outer surface 162 (not shown) that is opposite to the inner surface 161. The back panel 170 has an inner surface 171 (not shown) and an outer surface 172 that is opposite to the inner surface 171. As shown in Fig. 1, the glove is assembled such that the inner surfaces 161 and 171 are positioned facing or adjacent to one another. The inner surfaces 161 and 171 comprise that portion of the glove 10 positioned adjacent to a wearer's hand during use. Inner surface 171 is meant to be worn adjacent to the back of a wearer's hand, and inner surface 161 is meant to be worn adjacent to the palm side or front of a wearer's hand. The outer surfaces 162 and 172 comprise those portions of the glove which are positioned away from the wearer's hand during use.

The glove 10 shown in Fig. 1 comprises separate front and back panels 160 and 170, respectively, secured together about the periphery 150 to define an opening 155. Glove 10 has a longitudinal axis 25 and a transverse or lateral axis 30 extending perpendicular to the longitudinal axis 25.

The glove 10 is a differentially extensible hand article wherein at least a portion of the glove extends and/or contracts about a wearer's hand without the use of traditional elastic such as natural or synthetic rubber. By the term "differentially extensible" or "differential extensibility" it is meant herein to describe that quality of extensibility wherein portions of the glove extend or contract independently of other portions in response to varying hand sizes and motions. Preferably, this differential extensibility allows a range of hand sizes to fit comfortably within the glove. In the embodiment of Figure 1, glove 10 is provided with differential extensibility by utilizing a structural elastic-like film (SELF) web. Alternatively, differential extensibility to fit varying sized hands comfortably can be accomplished by various elastic-like materials, composite materials that produce elastic-like characteristics and/or processes to make a material(s) more elastic-like. As used herein, the term "elastic-like" describes the behavior of web materials such as web materials which, when subjected to an applied elongation, extend

in the direction of applied elongation. Also, when the applied elongation is released the web materials return, to a substantial degree, to their untensioned condition. The term "web" as used herein refers to a sheet-like material comprising a single layer of material or a laminate of two or more layers.

The back panel 170 of the glove 10 is extensible so as to dynamically fit and conform to a wearer's hand to provide improved fit about a wearer's hand. The force/extension properties or characteristics (e.g., extension forces, available stretch (extension), and contractive force(s)) of the back panel 170 are specifically designed to dynamically expand and move with the movements of the hand of the wearer to enhance fit.

As shown in Figure 1, the back panel 170 is joined to the front panel 160. The back panel 170 is extensible in a direction having a vector component substantially in the lateral direction, i.e., along the transverse or lateral axis 30, to provide a more comfortable and contouring fit about a wearer's hand by initially conformably fitting the glove about the hand and sustaining this fit throughout the time of wear. The back panel 170 allows portions of the glove 10 to expand with the hand and return to its original configuration as the hand moves. This expansion provides a snug yet unconstricted fit without the use of additional materials such as traditional elastics. This additional extensibility in the back of the glove allows the glove to better wrap around a wearer's hand. As a result, the glove fits the hand better and reduces sagging, gapping and slippage thus improving fit and conformability to a wearer's hand movements.

The back panel 170 may take on a number of different sizes and shapes. The size of the back panel may vary widely, depending upon its available stretch as designed by a manufacturer.

In use, a wearer inserts her hand into the glove 10 at the opening 155. As the hand fits into the glove 10, the back panel 170 expands and contracts around the back of the hand as necessary to produce a snug yet unconstricted fit about a wearer's hand without the use of traditional elastics. As used herein, the term "snug" describes a close fit of the glove 10 that does not substantially restrict the motion of a wearer's hand. The term "unconstricted" as used herein refers to a type of compression that would not significantly impede or retard normal motion of one's hand.

The back panel 170 may be constructed from a number of different materials. For performance and cost reasons, the back panel 170 is preferably constructed of a structural elastic-like film (SELF) web. Figure 2 shows an embodiment of a SELF web 52 of the present invention constructed of a single layer of a formed polymeric material.

The SELF web 52 is shown in its substantially untensioned condition. The web has two centerlines, a first or longitudinal centerline or axis, l, (which is also referred to as an axis, line, or direction "l") and a second or transverse centerline or axis, t, (which is also referred to as an axis, line or direction "t") which is generally perpendicular to the first centerline l. The web is comprised substantially of linear low density polyethylene (LLDPE) although it may also be comprised of other polyolefins such as polyethylene's including low density polyethylene (LDPE), ultra low density polyethylene (ULDPE), high density polyethylene (HDPE) or polypropylene and/or blends thereof of the above and other materials. Examples of other suitable polymeric materials include, but are not limited to, polyester, polyurethane's, compostable or biodegradable polymers, and breathable polymers.

Referring to Figures 2 and 2A, the SELF web includes a "strainable network" of distinct regions. As used herein, the term "strainable network" refers to an interconnected and interrelated group of regions which are able to be extended to some useful degree in a predetermined direction providing the SELF web with an elastic-like behavior in response to an applied and subsequently released elongation. The strainable network includes at least a first region 64 (also generally referred to herein as bands or channels) and a second region 66 (also generally referred to herein as ribs or pleats). The SELF web 52 also includes a transitional region 65 which is at the interface between the first region 64 and the second region 66. The transitional region 65 will exhibit behavior of both the first region and the second region. It is recognized that every embodiment of the present invention will have a transitional region. However preferred embodiments of the present invention will exhibit elastic-like behavior substantially as a result of the first region 64 and the second region 66. Therefore, the ensuing description of the present invention will be concerned with the behavior of the SELF web in the first regions and the second regions only and not the complex behavior of the SELF web in the transitional regions.

SELF web 52 has a first surface and an opposing second surface. In the preferred embodiment shown in Figures 2 and 2A, the strainable network includes a plurality of first regions 64 and a plurality of second regions 66. The first regions 64 have a first axis 68 and a second axis 69, wherein the first axis 68 is preferably longer than the second axis 69. The first axis 68 of the first region 64 is substantially parallel to the first axis l of the SELF web 52 while the second axis 69 is substantially parallel to the second axis t of the SELF web 52. The second regions 66 have a first axis 70 and a second axis 71. The first axis 70 is substantially parallel to the first axis l of the SELF

web 52, while the second axis 71 is substantially parallel to the second axis t of the SELF web 52. In the preferred embodiment of Figure 2, the first regions 64 and the second regions 66 are substantially linear, extending continuously in a direction substantially parallel to the first axis l of the SELF web 52.

The first region 64 has an elastic modulus E1 and a cross-sectional area A1. The second region 66 has an elastic modulus E2 and a cross-sectional area A2.

In the illustrated embodiment, the SELF web 52 has been "formed" such that the SELF web 52 exhibits a resistive force in a direction substantially parallel to the first axis l of the SELF web 52, when subjected to an applied axial elongation in a direction substantially parallel to the first axis l. As used herein, the term "formed" refers to the creation of a desired structure or geometry upon the SELF web that will substantially retain the desired structure or geometry when it is not subjected to any externally applied elongation's or forces. A SELF web of the present invention is comprised of at least a first region 64 and a second region 66, wherein the first region 64 is visually distinct from the second region. As used herein, the term "visually distinct" refers to features of the SELF web which are readily discernible to the normal naked eye when the SELF web or objects embodying the SELF web are subjected to normal use. A SELF web of the present invention is comprised of a strainable network of contiguous, "distinct", and "dissimilar" regions, wherein the strainable network includes at least a first region and a second region, where the first region has a "surface-pathlength" less than that of the second region, as measured parallel to a predetermined axis when the material is in an untensioned state. As used herein, the term "formed portion" refers to the portion of the material which is comprised of the desired structure or geometry of the strainable network. As used herein, the term "surface-pathlength" refers to a measurement along the topographic surface of the region in question in a direction parallel to the predetermined axis. As used herein, the term "distinct" or "dissimilar" when referring to regions, refers to regions within the strainable network having measurably different surface-pathlengths as measured parallel to a predetermined axis while the SELF web is in an untensioned condition. The method for determining the surface-pathlength of the respective regions can be found in the test methods section set forth in International Application WO 9503765, entitled "Web Materials Exhibiting Elastic-Like Behavior", published February 9, 1995, in the name of Chappell et al. and is thus incorporated herein by reference.

Methods for forming materials include, but are not limited to, embossing by mating plates or rolls, thermoforming, high pressure hydraulic forming, or casting.

While in embodiments as are shown in Figures 2 and 2A the entire SELF web has been formed, the present invention may also be practiced by forming only a portion thereof.

In the preferred embodiment shown in Figures 2 and 2A, the first regions 64 are substantially planar. That is, the material within the first region 64 is in substantially the same condition before and after the formation step undergone by the SELF web 52. The second regions 66 include a plurality of rib-like elements 74. The rib-like elements may be embossed, debossed or a combination thereof.

The rib-like elements 74 have a first or major axis 76 which is substantially parallel to the second axis t of the SELF web 52 and a second or minor axis 77 which is substantially parallel to the first axis l of the SELF web 52. The first axis 76 of the rib-like elements 74 is at least equal to, and preferably longer than the second axis 77. To enhance the two-stage resistive force versus elongation behavior characteristics of the SELF web 52, the ratio of the first axis 76 to the second axis 77 is at least 1:1, preferably at least 2:1, or greater. In general, the greater this ratio, the more pronounced will be the two-stage resistive force versus elongation characteristic of the SELF web.

The first region 64 and the second region 66 each have a "projected pathlength". As used herein, the term "projected pathlength" refers to the length of a shadow of a region that would be thrown by parallel light. The projected pathlength of the first region 64 and the projected pathlength of the second region 66 are equal to one another.

The first region 64 has a surface-pathlength, L1, less than the surface-pathlength, L2, of the second region 66 as measured topographically in a direction parallel to the first axis of the SELF web while the SELF web is in an untensioned condition. To enhance the two-stage resistive force versus elongation behavior characteristic of the SELF web having strainable networks of the present invention, the surface-pathlength of the second region 66 is at least about 15 percent greater than that of the first region, more preferably at least about 30 percent greater than that of the first region, and most preferably at least about 70 percent greater than that of the first region. In general, the greater the surface-pathlength of the second region, the greater will be the elongation of the SELF web.

What makes the SELF web particularly well suited for use as a panel of the glove 10 is that it exhibits a modified "Poisson lateral contraction effect" substantially less than that of an otherwise identical base web of similar material composition. As used herein, the term "Poisson lateral contraction effect" describes the lateral contraction behavior of a material which is being subjected to an applied elongation. The method

for determining the Poisson lateral contraction effect of a material can be found in the test methods section set forth in International Application WO 9503765, entitled "Web Materials Exhibiting Elastic-Like Behavior", published February 9, 1995, in the name of Chappell et al. and is thus incorporated herein by reference. Preferably, the Poisson lateral contraction effect of the SELF web of the present invention is less than about 0.4 when the web is subjected to about 20 percent elongation. Preferably, the SELF web exhibits a Poisson lateral contraction effect less than about 0.4 when the SELF web is subjected to about 40, 50 or even 60 percent elongation. More preferably, the Poisson lateral contraction effect is less than about 0.3 when the SELF web is subjected to 20, 40, 50 or 60 percent elongation. The Poisson lateral contraction effect of SELF webs of the present invention is determined by the amount of the web material which is occupied by the first and second regions, respectively. As the area of the SELF web occupied by the first region increases, the Poisson lateral contraction effect also increases. Conversely, as the area of the SELF web occupied by the second region increases the Poisson lateral contraction effect decreases. Preferably, the percent area of the SELF web occupied by the first areas is from about 2% to about 90%, and more preferably from about 5% to about 50%.

Referring now to Figure 2B, as the SELF web is subjected to an applied axial elongation, D, indicated by arrows 80 in Figure 2, the first region 64 having the shorter surface-pathlength, L1, provides most of the initial resistive force, P1, as a result of molecular-level deformation, to the applied elongation which corresponds to stage I. While in stage I, the rib-like elements 74 in the second region 66 are experiencing geometric deformation, or unbending and offer minimal resistance to the applied elongation. In the transition zone (720b), as shown in Fig. 3, between stages I and II, the rib-like elements 74 are becoming aligned with the applied elongation. That is, the second region is exhibiting a change from geometric deformation to molecular-level deformation. This is the onset of a force wall. In stage II, as seen in Figure 2C, the rib-like elements 74 in the second region 66 have become substantially aligned with the plane of applied elongation (the second region has reached its limit of geometric deformation) and begin to resist further elongation via molecular-level deformation. The second region 66 now contributes as a result of molecular-level deformation in stage II a second resistive force, P2, to further elongation. The resistive forces to elongation provide a total resistive force, PT, which is greater than the resistive force depicted in stage I. Accordingly, the general slope of the force-elongation curve in stage II is significantly greater than the general slope of the force-elongation curve in

stage I.

The resistive force P1 is substantially greater than the resistive force P2 when (L1+D) is less than L2. While (L1+D) is less than L2 the first region 64 provides an initial resistive force, P1, generally satisfying the equation:

$$P1 = \frac{(A1*E1*D)}{L1}$$

When (L1+D) is greater than L2 the first and second regions provide a combined total resistive force, PT, to the applied elongation, D, generally satisfying the equation:

$$PT = \frac{(A1*E1*D)}{L1} + \frac{(A2*E2*|L1+D-L2|)}{L2}$$

The maximum elongation occurring while in stage I is considered to be the "available stretch" of the SELF web. The available stretch corresponds to the distance over which the second region experiences geometric deformation. The available stretch can be effectively determined by inspection of the force-elongation curve 720 as shown in Figure 3. The approximate point at which there is an inflection in the transition zone between stage I and stage II is the percent elongation point of "available stretch". The range of available stretch can be varied from about 10% to 100% or more; this range of elongation is often found to be of interest in disposable absorbent articles, and can be largely controlled by the extent to which surface-pathlength L2 in the second region 66 exceeds surface-pathlength L1 in the first region 64 and the properties (composition) of the base film. The term available stretch is not intended to apply a limit to the elongation which the web of the present invention may be subjected to as there are applications where elongation beyond the available stretch is desirable. Significantly higher forces are required to achieve percent elongation's in the base film equivalent to those percent elongation's in the SELF web 52. The approximate extent of stage I can be controlled as desired by adjusting the pathlengths, L1 and L2, in an untensioned condition. The force-elongation behavior of stage I can be controlled by adjusting the width, thickness, and spacing of first region 64 and the properties of the base film.

Referring again to Figure 3, there is shown a graph of the resistive force-elongation curve 720 of a formed polymeric SELF web of the present invention shown in Figure 2 along with a curve 710 for a base film of similar composition. Specifically, the samples are polymeric web materials comprised substantially of linear low density polyethylene, approximately 0.001 inches thick, designated Sample 1401 available from

Clopay of Cincinnati, Ohio. The method for generating the resistive force-elongation curves can be found in the test methods section set forth in subsequent portions of the specification. Referring now to the force-elongation curve 720, there is an initial substantially linear, lower force versus elongation stage I designated 720a, a transition zone designated 720b, and a substantially linear stage II designated 720c which displays substantially higher force versus elongation behavior.

As seen in Figure 3, a SELF web exhibits different elongation behavior in the two stages when subjected to an applied elongation in a direction parallel to the first axis of the SELF web. The resistive force to the applied elongation is significantly different between stage I (720a) and stage II (720c) of curve 720 as compared to curve 710 which does not exhibit this behavior. As seen in Figure 3, the SELF web exhibits different elongation behavior in the two stages when subjected to an applied elongation in a direction parallel to the first axis of the SELF web. The resistive force exerted by the SELF web to the applied elongation is significantly less in the stage I region (720a) versus the stage II region (720c) of curve 720. Furthermore, the resistive force exerted by the SELF web to the applied elongation as depicted in stage I (720a) of curve 720 is significantly less than the resistive force exerted by the base web as depicted in curve 710 within the limits of elongation of stage I. As the SELF web is subjected to further applied elongation and enters stage II (720c) the resistive force exerted by the SELF web increases and approaches the resistive force exerted by the base web. The resistive force to the applied elongation for the stage I region (720a) of the SELF web is provided by the molecular-level deformation of the first region of the SELF web and the geometric deformation of the second region of the SELF web. This is in contrast to the resistive force to an applied elongation that is provided by the base web depicted in curve 710 of Figure 6, which results from molecular-level deformation of the entire web. SELF web materials of the present invention can be designed to yield virtually any resistive force in stage I which is less than that of the base web material by adjusting the percentage of the web surface which is comprised of the first and second regions, respectively. The force-elongation behavior of stage I can be controlled by adjusting the width, thickness, and spacing of the first region and the composition of the base web.

Referring again to Figures 1 and 2, the first axes 68 and 70 of the first and second regions 64 and 66, respectively, are aligned parallel to the transverse axis 30. This alignment provides the best fit and stretch of the glove 10 across the back of a user's hand, i.e., along the transverse axis 30. An alternative embodiment to that in Figure 1 is

a glove 10 in which the first axes 68 and 70 of the first and second regions 64 and 66, respectively, on the back panel 170 are aligned (i.e., being parallel) with the longitudinal axis 25. This configuration would provide enhanced stretch substantially along the longitudinal axis 25.

Figure 4 shows another embodiment of a back panel 270. The back panel 270 is shown or viewed from the outer surface 272 in Fig. 4. The back panel 270 comprises a SELF web 252.

Referring to Figures 4 and 5, the SELF web 252 has two centerlines, a first or longitudinal centerline or axis 125, (which is also referenced to as an axis, line, or direction) and a second or transverse centerline or axis 130, (which is also referred to as an axis, line or direction). The SELF web 252 has a plurality of first regions 164 extending in a direction parallel to the first centerline 125. The SELF web 252 also has a plurality of first regions 264 extending in a direction parallel to the second centerline 130. As can be seen in Fig. 5, the first regions 164 and the first regions 264 intersect one another. Note, the SELF web 252 in Fig. 5 is in an untensioned condition. Note, Fig. 5 is an approximate view of the complex geometric configuration of a portion of web 252 and is not meant to be all-inclusive. Rather, Fig. 5 is meant to approximate the major geometry believed to be responsible for providing extension in multiple directions throughout SELF web 252.

Again referring to Figure 5, the SELF web 252 also has a plurality of intersecting and overlapping second regions which form regions 210. Each region 210 comprises multiple second regions preferably oriented substantially perpendicularly to one-another in an untensioned condition. It is noted, however, that second regions can be oriented and intersected with one-another at any angle desired by a manufacturer and/or as produced by a tensioned condition. The second regions comprise rib-like elements similar to the rib-like elements 74 disclosed herein and in Fig. 2A.

While not wishing to be bound by any particular theory, it is believed that the geometric relationships that provide the overlap and intersection of the first regions 164 and 264 and the second regions which form region 210 aid in enabling the SELF web 252 to be extensible in multiple directions. Longitudinal and transverse directional axes are indicated by arrows 90 and 190 in Fig. 5. Elongation is expected to occur not only along axes 90 and 190, but also along directional vectors between axes 90 and 190. While not wishing to be bound by any particular theory, it is believed that these directional vectors along which web 252 may extend are created by applied forces acting in multiple directions along these vectors.

Fig. 5A discloses a detailed photograph of web portion of web 252 as in Fig. 5. The photograph comprises a maginified view of the SELF web 252. The first regions 164 and 264 are called out, as well as second regions 166 and 266.

It should be seen from the foregoing that a SELF web 252 can comprise as many intersecting and/or connecting first and second regions as desired and in as many configurations as desired. Directional axes are not restricted to the transverse and longitudinal axes 90 and 190, respectively. Directional axes can span 'radially' between axes 90 and 190 along a plurality of vectors of elongation. Viewing axes 90 and 190 as coordinate axes, directional vectors can be described as existing between 0 and 90°, 90 and 180°, 180 and 270°, and 270 and 360° of the axes 90 and 190.

Referring now to Fig. 5A there is shown an enlarged photograph of a SELF web 252. SELF web has a plurality of first regions 164 extending in a first direction and a plurality of first regions 264 extending in a direction perpendicular to the first regions 164. SELF web 252 also has a plurality of intersecting and overlapping second regions which form regions 210.

Figure 4A shows another embodiment of the front panel 160, as viewed from its outer surface 161. The front panel 160 comprises dimples 42 which protrude outwardly from the outer surface 161. While not wanting to be bound to any particular theory, it is believed that these protruded dimples 42 provide greater grip enabling a user to better grasp objects. The dimples are formed by applying heat and then vacuum thermoforming a polyethylene, and preferably a low-density polyethylene film. A process for forming the dimples 42 is described in U. S. Patent No. 3,861,529, "Package and Method of Making" issued to Coleman et al. on January 1, 1975 and also, U. S. Patent No. 4,114,758, "Package and Method of Making" issued to Coleman et al. on September 19, 1978. These patents are hereby incorporated by reference.

In all glove embodiments disclosed herein, the first or inner surface 171 of the back panel 170 and/or the second or outer surface 162 of the front panel 160 can comprise non-woven material which can function as an absorbent and/or a deliverer of embedded substances. Embedded substances can include surfactant, water, alcohol, lotion, anti-perspirant, medicine, cleaning agents, bleach or any mixture of the foregoing.

In a preferred embodiment, the front panel 160 and the back panel 170 are fitted together such that there is a seamless construction at the periphery 150 which, when formed, comprises edge of connection 121 along the front panel 160 and edge of connection 122 along the back panel 170. This can be accomplished by many methods. One method is to graft an additional layer of polyethylene film over the periphery 150

(Fig. 1) and heat seal the graft in place. Another method is to overlap (i.e., fold over) the connection edges 121 and 122 such that the edges 121 and 122 do not connect to one-another but rather, connection edge 121 is sealed to the first surface of the back panel 170 and the connection edge 122 is sealed to the second surface of the front panel 160. This overlap method can be accomplished by heat sealing, adhesives and/or other attachment means known in the art for fitting together polyethylene films.

Figure 6 shows a mitt 15 comprising a back panel 22 connected to a front panel 21 that defines a hollow interior into which a hand may be inserted through opening 55. The back panel 22 and the front panel 21 are connected along a portion of the periphery 45. The back panel 22 further comprises an outer surface 32 and an inner surface 33 that is opposite the outer surface 32 and is immediately adjacent to the back of a user's hand during use. The front panel 21 also further comprises an outer surface 34 (not shown) and an inner surface 35 that is opposite the outer surface 34 and is immediately adjacent to the palm of a user's hand during use. Thus a wearer's hand is covered by the interior surfaces of the front panel 21 and back panel 22 for protection against waste products, urine, liquids, etc., when using the mitt 15, as described below. Preferably, the front panel outer surface 34 has an absorbent layer 20 joined thereto which can comprise non-woven materials or various woven materials such as cotton or cotton polyesther. The absorbent layer 20 may comprise an additive such as lotion, surfactant, alcohol, water, perfume, anti-perspirant, medicine, cleaning agents, bleach or any mixture of these.

Like the back panel 170 of the glove 10, the back panel 22 of the mitt 15 is differentially extensible and preferably comprises a structural elastic-like film (SELF) web. The differential extensibility provided by the SELF back panel 22 allows a range of hand sizes to fit comfortably within the mitt 15. In alternative embodiments, differential extensibility to fit varying sized hands can be accomplished by various elastic-like materials, composite materials that produce elastic-like characteristics and/or processes to make a material(s) more elastic-like.

Referring again to Figs. 2 and 2A and the discussions herein, the back panel 22 of the mitt 15 is of the same construction as the back panel 170 of the glove 10. Other embodiments are contemplated using the aforementioned panels for the construction of a mitt with or without a thumb covering.

In use, a wearer of the mitt 15 inserts a hand into the hollow interior through the provided opening 55 wherein the back panel 22 contacts the back of the wearer's hand and the inner surface 35 of the front panel 21 contacts the wearer's palm, and thereafter properly positions the absorbent layer 20 for cleaning, wiping and/or absorbing.

At the end of its use, the mitt can be everted by making a fist with the mitt-hand, pulling the structure over the fist from the back edge 40 of the mitt 15. Thus the layers are transposed, and the inner surface 35 of the front panel 21 and the inner surface 33 of the back panel 22 become the outer surfaces of the now waste article. More simply stated, the mitt is turned inside out after its use and then thrown away.

Upon use, the hand of the wearer is protected against waste products of various contacted surfaces as the hand contacts only the interior surfaces of the inner layers which are water-repellent and water-proof. When contact with a surface has been completed, or when the mitt 15 has become saturated, it is turned inside out, whereby the inner surfaces 33 and 35 become the outer surfaces, and the outer surfaces 32 and 34 become the inner surfaces. That is, the wearer makes a fist, and with his or her other hand, grasps a point on the back edge 40 and carefully pulls the fisted hand toward the open mouth of the mitt 15, until the entire end of the mitt 15 is pulled through the opening 55.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

WHAT IS CLAIMED IS:

1. A hand article having a longitudinal axis, a transverse axis perpendicular to said longitudinal axis, and a periphery, characterized in that:

said hand article comprises a front panel having an inner surface and an outer surface, and a back panel having an inner surface and an outer surface, said inner surface of said back panel being positioned adjacent to said inner surface of said front panel, said front panel and said back panel being joined together to form an opening in which to insert a hand, said back panel comprising a structural elastic-like film web, said web comprising a strainable network having first and second regions formed of substantially the same material composition, said first region providing a first, elastic-like resistive force to an applied elongation along at least one axis, said second region providing a second distinctive resistive force to further applied elongation along at least one axis, thereby providing at least two stages of resistive forces in use.

2. A hand article having a longitudinal axis, a transverse axis perpendicular to said longitudinal axis, and a periphery, characterized in that:

said hand article comprises a front panel having an inner surface and an outer surface and a back panel having an inner surface and an outer surface, said inner surface of said back panel being positioned adjacent to said inner surface of said front panel, said front panel and said back panel being joined together to form an opening in which to insert a hand, the extension force of said back panel being less than the extension force of said front panel over a given hand movement.

3. The hand article of Claim 2 wherein said back panel comprises a structural elastic-like film web, said web comprising a strainable network having first and second regions formed of substantially the same material composition, said first region providing a first, elastic-like resistive force to an applied elongation along at least one axis, said second region providing a second distinctive resistive force to further applied elongation along at least one axis, thereby providing at least two stages of resistive forces in use.

4. The hand article of any one of the preceding claims wherein said hand article comprises a glove or a mitt.

5. The hand article of any one of the preceding claims wherein said front and back panels comprise a polymeric film.

6. The hand article of Claims 1, 3, 4, or 5 wherein said structural elastic-like film web includes two or more axes, said axes being oriented substantially perpendicular to one-another.

7. The hand article of Claims 1, 3, 4, 5 or 6 wherein said structural elastic-like film web includes two or more axes, said axes being oriented substantially radially to one-another.

8. The hand article of any one of the preceding claims further comprising an absorbent layer joined to said inner surface, said outer surface or both of said front panel.

9. The hand article of Claim 7 wherein said absorbent layer comprises at least one additive selected from the group consisting of lotion, surfactant, alcohol, water, perfume, anti-perspirant, medicine, cleaning agents, bleach or mixtures thereof.

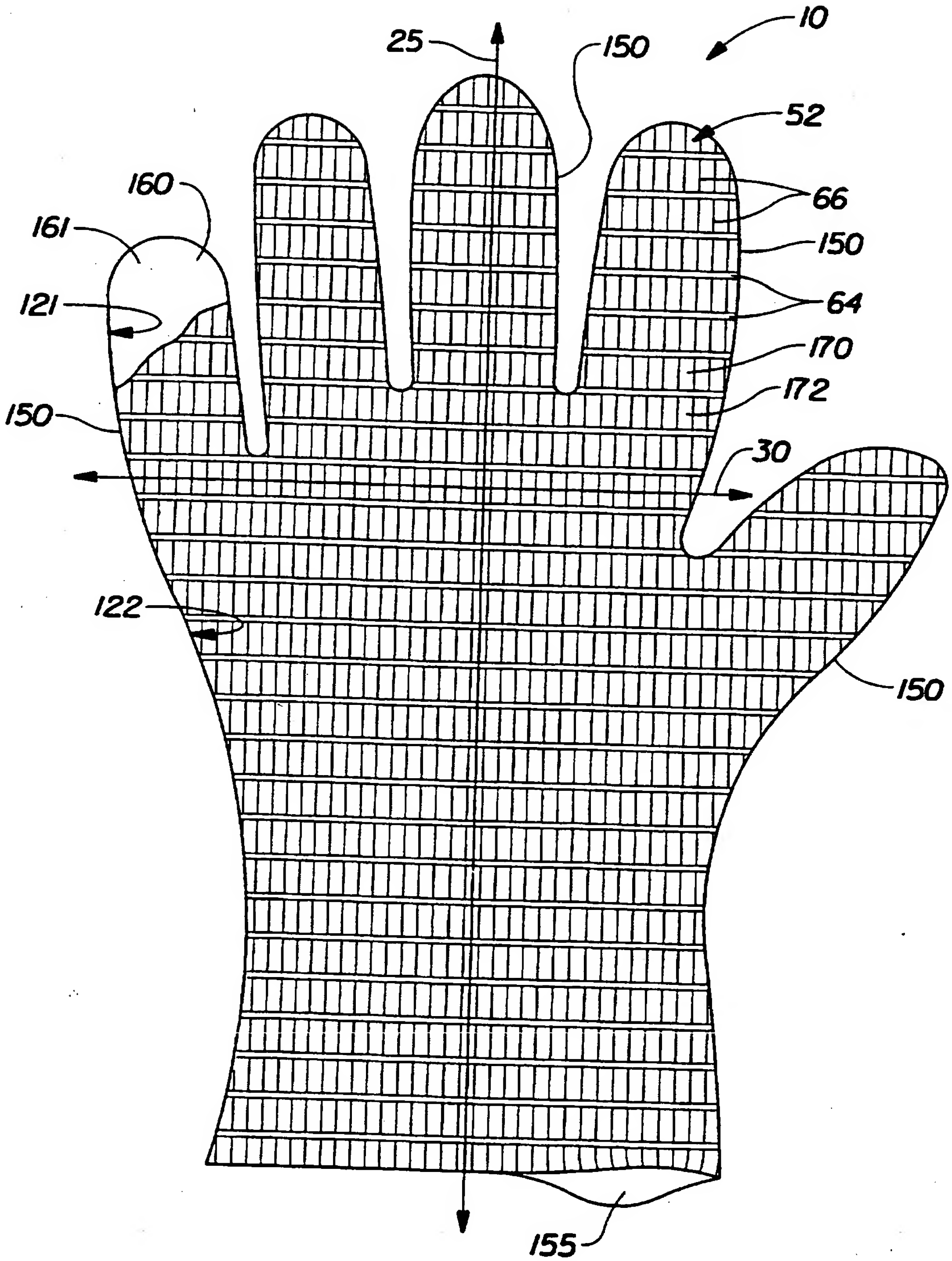

Fig. 1

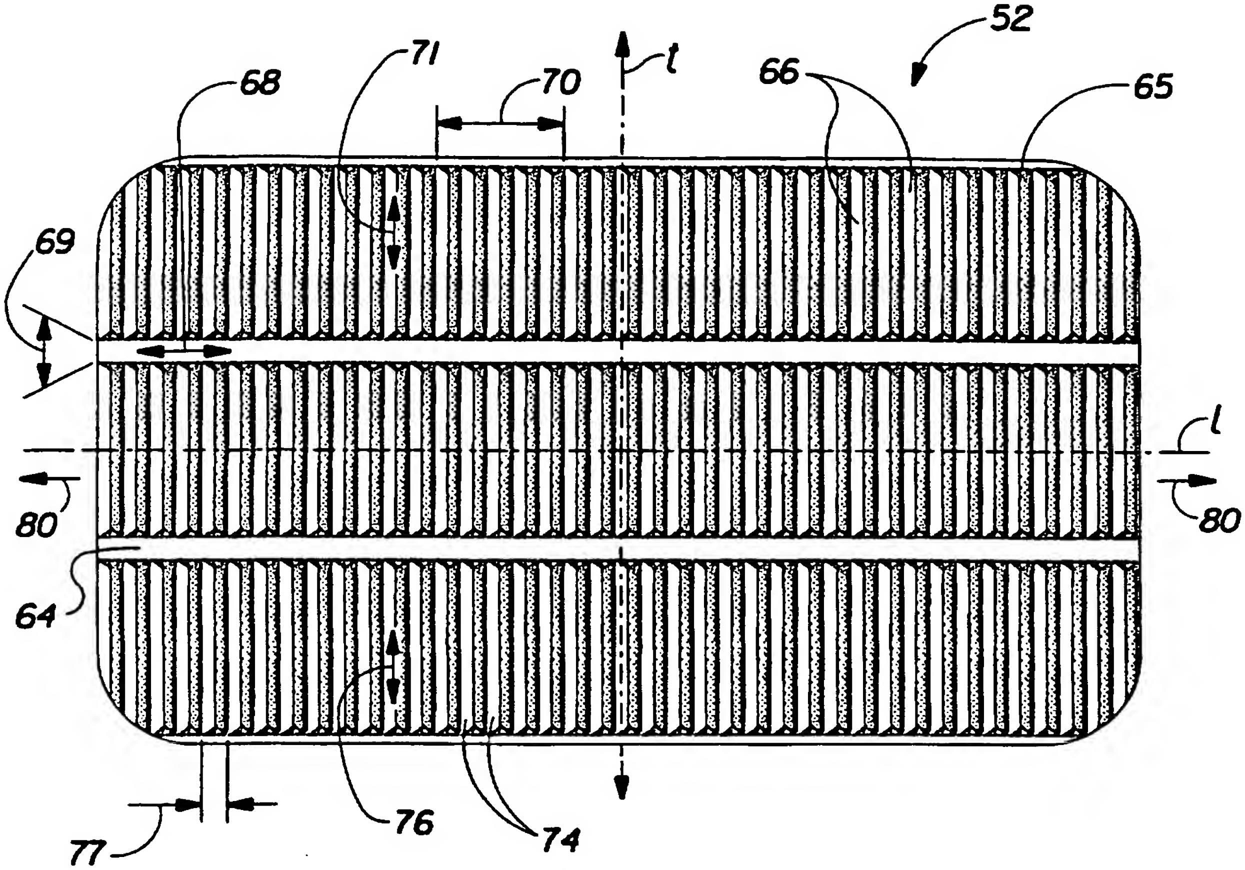

Fig. 2

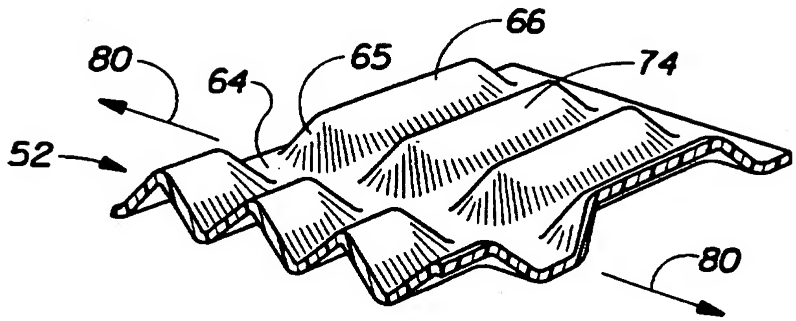

Fig. 2A

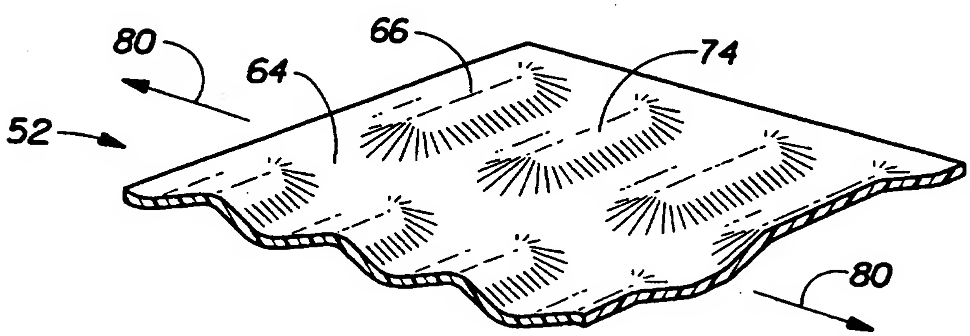

Fig. 2B

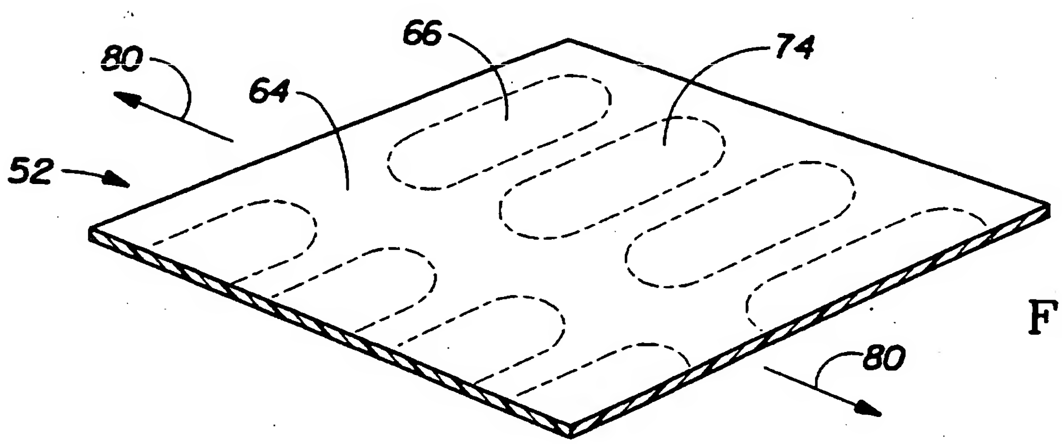

Fig. 2C

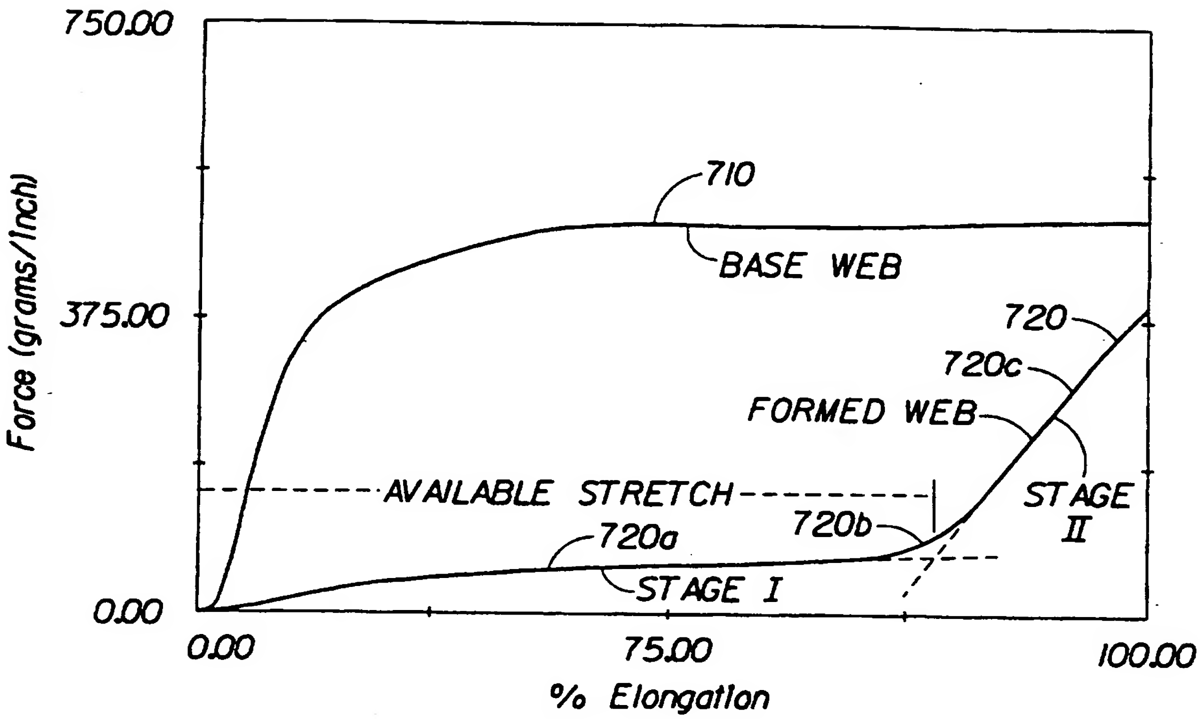
750.00
375.00
0.00
Force (grams/Inch)
0.00
75.00
100.00
% Elongation
710
BASE WEB
720
720c
FORMED WEB
AVAILABLE STRETCH
720b
720a
STAGE I
STAGE II

Fig. 3

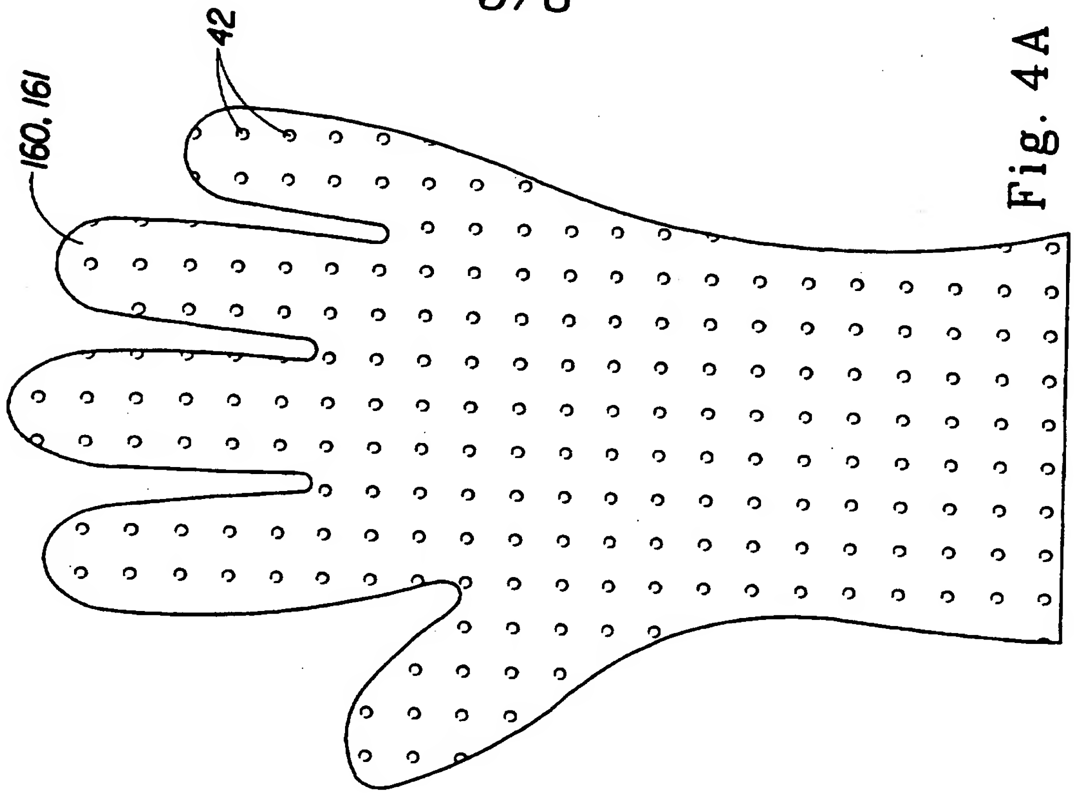

Fig. 4A

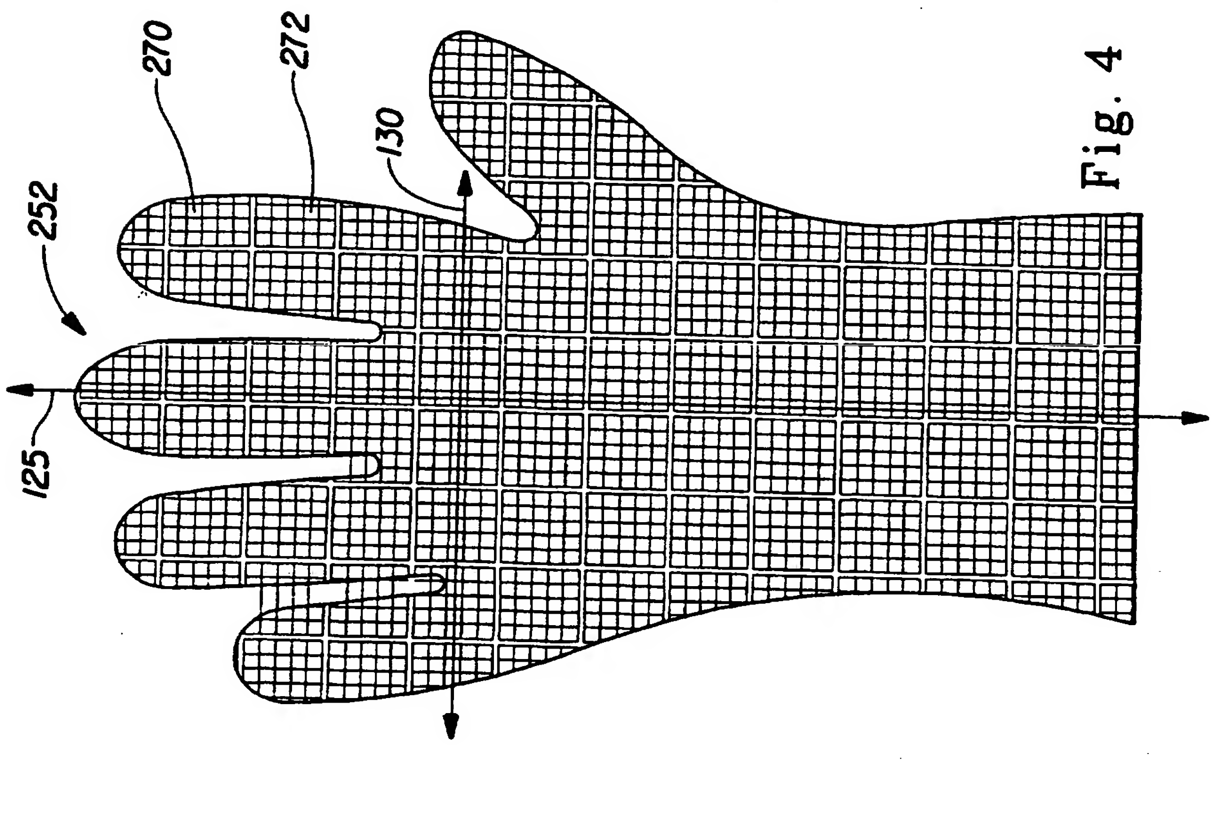

Fig. 4

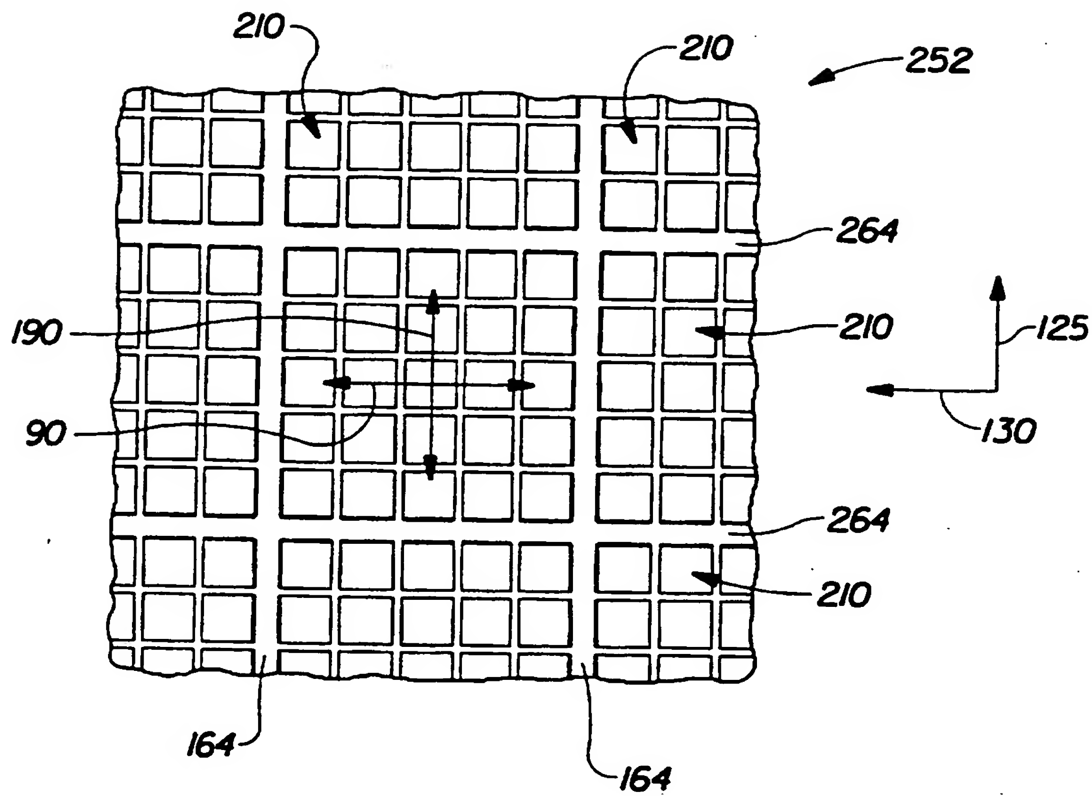

Fig. 5

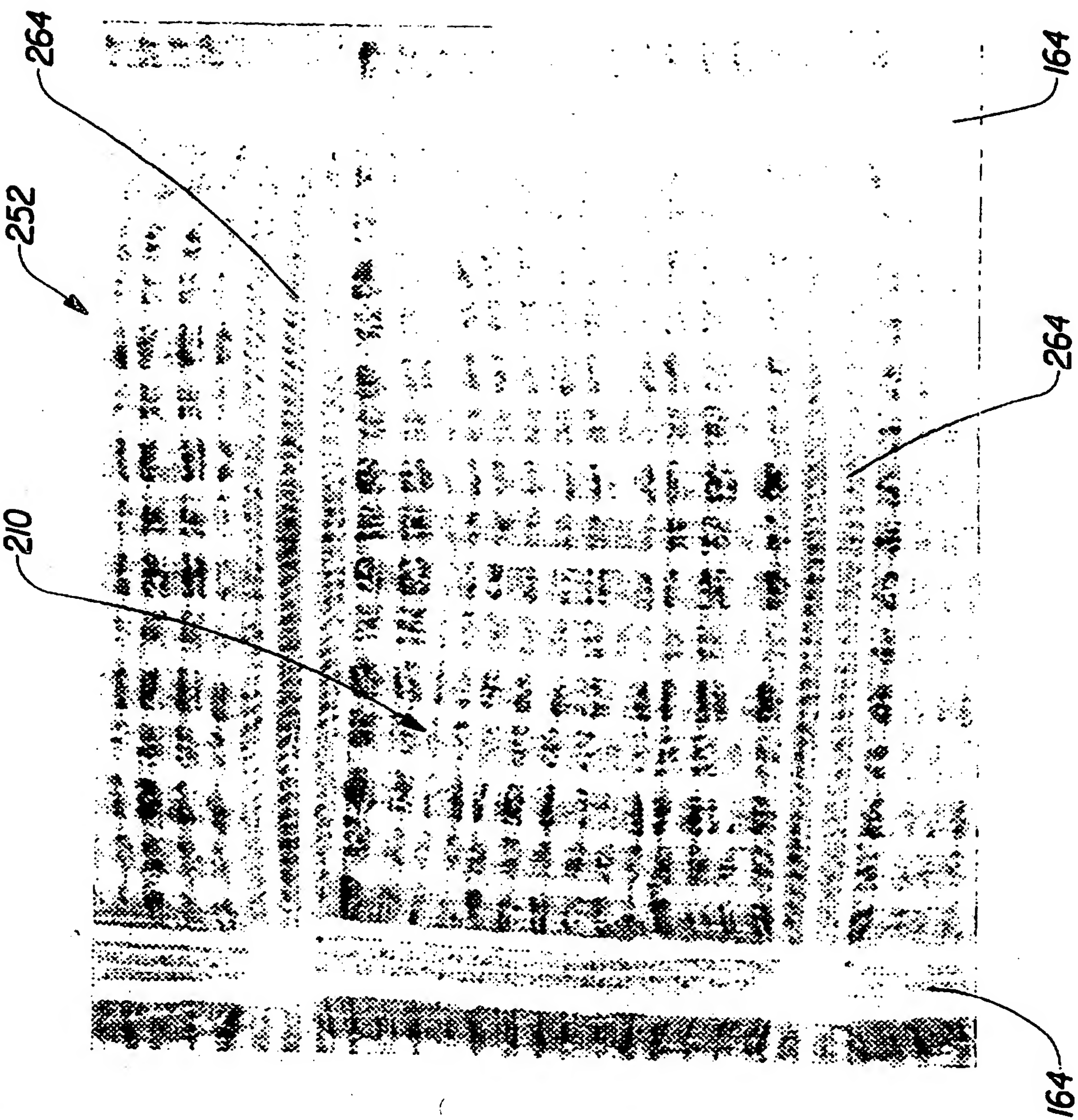

Fig. 5A

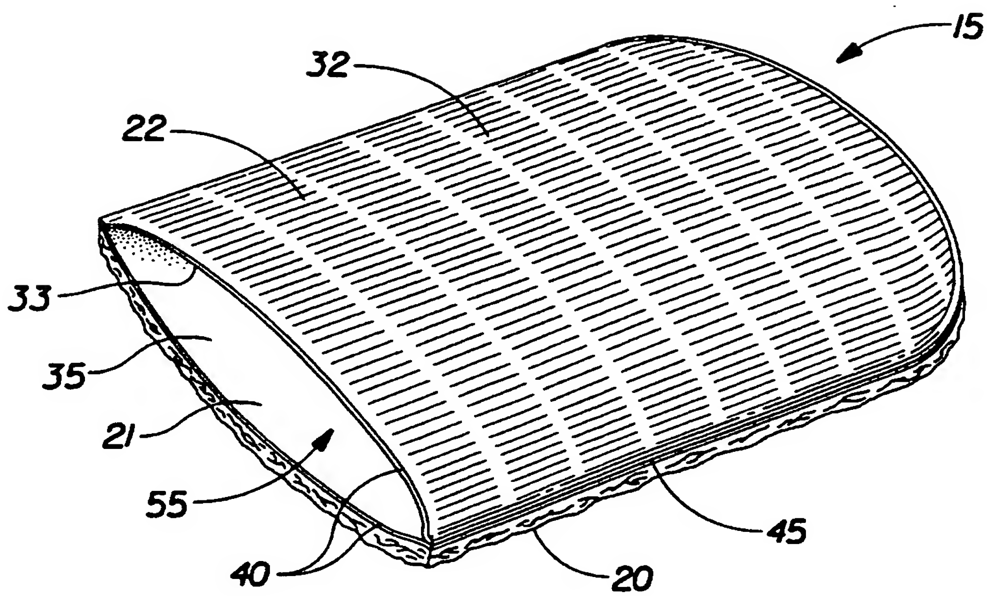

Fig. 6

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 97/06239

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A41D19/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A41D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 95 03765 A (THE PROCTER & GAMBLE COMPANY) 9 February 1995 cited in the application see page 11, line 5 - page 16, line 24; figures 5,6 ---	1,5,6
A	WO 91 12132 A (W. L. GORE & ASSOCIATES INC.) 22 August 1991 see page 10, line 32 - page 14, line 32 ---	1,5,6,8
A	FR 2 103 384 A (A. OSER) 7 April 1972 see the whole document ---	1
A	US 3 283 338 A (L. LANDAU) 8 November 1966 see column 2, line 21 - line 69; figures 1-7 -----	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

1

Date of the actual completion of the international search	Date of mailing of the international search report
6 August 1997	21.08.97

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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PCT/US 97/06239

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